

2016

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Recommended Citation

Chamakiotis, Petros; Boukis, Achilleas; and Panteli, Niki, "The Fuzzy Front-End of Innovation in Temporary Virtual Project Teams" (2016). *MCIS 2016 Proceedings*. 4.
<http://aisel.aisnet.org/mcis2016/4>

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THE FUZZY FRONT-END OF INNOVATION IN TEMPORARY VIRTUAL PROJECT TEAMS

Research in Progress

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Abstract

In this paper, we study the fuzzy front-end (FFE) of innovation in the context of temporary virtual project teams (VPTs). We argue that despite the importance of innovation for today's organizations, and the prevalence of VPTs in most industries, there are no studies examining how the innovation process plays out in this context. We draw on two temporary VPTs (Saint-Germain and Los Innovadores) from two different engineering-related Industry-Academia collaboration projects. Saint-Germain was a 24-hour-long VPT of five engineers dispersed in two countries. Los Innovadores was a 5-month-long VPT of engineers and designers dispersed across five countries. We collected interview, observation, documentary, and other data from both teams from start to end of the VPT lifecycle, which we analysed thematically. Our analysis is still underway and so far: (a) unpacks the different stages relative to FFE activities; and (b) begins to explain how the unique characteristics of VPTs (e.g. dispersion) influence the FFE activities in the VPTs under study. In the paper, we present preliminary findings and outline the expected contributions of our study.

Keywords: virtual project teams, fuzzy front-end, new product development, innovation.

1 Introduction

In today's globalizing business environment, where rapidly changing technologies are exponentially introduced and customer needs constantly change, intense pressure is placed on organizations to deliver innovative products (Bohlmann *et al.*, 2013). In this increasingly competitive environment, innovation has emerged as one of the most vexing challenges for contemporary corporations to ensure long-term success (Kyriazis *et al.*, 2015). As a result, a plethora of studies look into the management of the various stages of the **new product development** (NPD) process and how organizations can stimulate, manage successfully and speed their NPD efforts (e.g. Storey *et al.*, 2016). A critical aspect of NPD success, which remains relatively unexplored, is associated with the management of the front-end innovation phases (a.k.a. **fuzzy front-end**; FFE). In this paper, we examine this phase within the context of **virtual project teams** (VPTs) which is becoming increasingly common in NPD (e.g. Lee and Panteli, 2010).

The FFE refers to the early NPD phases, in which ideas are generated and evaluated, potential concepts formulated, and potential development projects initially planned (Khurana and Rosenthal, 1998; Kock *et al.*, 2015). During the FFE, teams decide on major issues which can severely affect the nature of innovation and subsequently the overall development cost and project success (e.g. the quality of the ideas that enter the formal development phase) (Verworn *et al.*, 2008) and the lack of proficiency at this stage might have a significant impact on the early market entry of new products and subsequently on sales (Hultink and Robben, 1999). Nevertheless, there is no literature explicitly addressing the management of development teams during FFE.

In this paper, we take the case of temporary VPTs on which organizations increasingly see as a means for transcending organizational boundaries and capitalizing on global expertise and cross-cultural collaboration (Badrinarayanan and Arnett, 2008; Salomo *et al.*, 2010). Although there exist studies on NPD in the VPT context (Gressgård, 2011; Gajendran and Joshi, 2012), the extant literature has neglected the study of the FFE in this context, despite the acknowledgement that unique characteristics of VPTs (e.g. geographical dispersion, asynchronous communication) make the management of highly unstructured and diverse innovation phases, such as the FFE, a challenge for serial innovators (Frisshammar *et al.*, 2011). Moreover, given the high uncertainty and the time restrictions that development teams face when pacing development activities, the impact of time pressure on VPTs' ability to successfully meet the FFE goals also needs further consideration (Chong *et al.*, 2012).

This study draws on two VPTs from two engineering-related Industry-Academia collaboration projects. The first VPT, Saint-Germain (a pseudonym), was a 24-hour-long VPT of five engineers dispersed in two countries. The second VPT, Los Innovadores (a pseudonym), was a 5-month-long VPT of engineers and designers dispersed across five countries. Though we selected two VPTs which share a number of similarities, they purposely differ in terms of project duration (24 hours vs. five months), for reasons which we explain later. We collected interview, observation, documentary, and other data from both teams from start to end of the VPT lifecycle, which we analysed thematically.

The remainder of this paper is organized as follows: First, we review the literature on the FFE and VPTs in NPD. We then present the two teams we focused on and explain our data collection and analysis approaches. Finally, we discuss our preliminary findings so far and our expected contributions.

2 Literature Review

2.1 The Fuzzy Front-End Phases of New Product Development

Although various frameworks elaborate on the steps that should be followed to enhance NPD success (Kyriazis *et al.*, 2015), scholars concur that NPD is mainly divided into three main phases: *front-end*,

development, and commercialization (Khurana and Rosenthal, 1998). The front-end (or FFE) begins “when an opportunity is first considered worthy of further ideation, exploration, and assessment and ends when a firm decides to invest in the idea, commit significant resources to its development, and launch the project” (Kim and Wilemon, 2002; p. 270). Scholars identify a number of tasks associated with the FFE such as product strategy formulation and communication, opportunity identification and assessment, idea generation, product definition, project planning, and early executive reviews (Khurana and Rosenthal, 1998). Given the nature of the tasks at hand within each of these phases, FFE remains highly fuzzy, unstructured and knowledge-intensive (Frishammar et al., 2011), remaining the most uncertain part of the innovation process to manage (Kim and Wilemon, 2002). Decision making during the FFE involves the most strategic decisions of setting goals and allocating resources for product development while operative level managers need to centre their efforts on the most attractive products for customers and also terminate the less viable ones as early as possible (Urban et al., 1993).

Despite the centrality of the FFE for NPD success, research in this area remains limited. Scholars assess how various front-end organizational practices (e.g. climate) contribute to FFE quality and front-end success (Bertels et al., 2011), examine the impact of task execution proficiency and decision criteria on sequential FFE stages (Khurana and Rosenthal, 1998), investigate the role of technical uncertainty during the front-end phases (Verworn et al., 2008), advise on how the early stages of radical and incremental innovations should be differently managed (de Brentani and Reid, 2012), and lastly discuss the extent to which FFE activity contributes to overall NPD success (e.g. Verworn et al., 2008). More recently, some work has focused on the resources requirements and creativity during FFE. In particular, researchers shed light on the knowledge conceptualization process during various FFE phases on the role of resource availability on FFE success (Markham, 2013), on how ideas can be created, selected and successfully implemented (Kock et al., 2015), as well as on top management’s role in this process (Globocnik and Salomo, 2015).

Despite these insights on how the FFE is managed, this literature neglects some critical issues that might influence the FFE phase. Although there is some literature on VPTs in NPD (e.g. Gajendra and Joshi, 2012; Parjanen et al., 2012), we do not know how the FFE is managed in the context of VPTs. How is the management of FFE in VPTs different to that of traditional teams? And how do the unique characteristics of VPTs influence this? These questions are important given that, as globalized competition and product variety expansion demand the acceleration of the innovation circle, the use of VPTs has become a necessity for organizations to achieve economies of scale and leverage scarce resources across geographic and other boundaries (Magni et al., 2013). In the next section, we seek to understand what makes VPTs different to traditional teams and review the extant literature on VPTs in NPD in particular.

2.2 Virtual Project Teams in New Product Development

The **information systems** (IS) and the team management literatures concur that VPTs comprise members that work on a common goal from distant locations predominantly via **information and communication technologies** (ICTs) (Cascio, 2000; Kayworth and Leidner, 2000; Lipnack and Stamps, 1997). VPTs emerged as a response to a highly competitive global business environment, wherein organizations are expected to capitalize on global expertise, cross-cultural collaboration, and time differences (Cascio, 2000). The relevant literature highlights that, among these benefits, VPTs provide opportunities for increased creativity and innovation (Chamakiotis et al., 2013; Schachaf, 2008). However, VPTs present a number of challenges as well. Participation in VPTs oftentimes entails having no work or other history with the rest of the team, working in different time zones, and being part of a highly diverse team. In addition, different types of VPTs have been posited: (a) inter- vs. intra-organizational (*organization-related difference*); (b) global or local (*location-related difference*); (c) temporary or permanent (*time-related difference*) (Panteli, 2004); (d) partially (comprising two or more physically collocated subgroups) vs. fully dispersed (comprising physically isolated members

only) (*dispersion*-related difference; Ocker *et al.*, 2011). What is more, VPTs differ in terms of their degree of virtualness — with some being completely virtual with no **face-to-face** (F2F) collaboration whatsoever, and others being hybrid, thus combining both F2F and virtual components (Griffith *et al.*, 2003). As it follows, not all VPTs are the same and, as a result, different VPTs are presented with different challenges.

Among the many challenges encountered in this literature, researchers posit achieving innovation in may be challenging (Gibson and Gibbs, 2006). VPTs have become prevalent in the field of NPD as well, as firms strive to gain access to local resources — including people, local knowledge, and specialized skills (Bengtsson and Solvell, 2004), and as also discussed above. However, there are limited studies explicitly exploring the role of VPTs during NPD tasks (e.g. Harvey and Griffith, 2007; Muethel and Hoegl 2016). These studies discuss successful global product launches (Harvey and Griffith, 2007) and also uncover the role of various internal conditions, such as climate (Bertels *et al.*, 2011), the role of resource commitment (Salomo *et al.*, 2010) and leadership approach (Gajendra and Joshi, 2012), as well as other contextual factors and collaboration mechanisms (Badrinarayanan and Arnett, 2008) which affect VPT performance in NPD. Given there are no studies examining the FFE in VPTs, we ask the following research question:

How is the FFE managed in the context of VPTs?

3 Research Approach

We adopted the qualitative case study approach (Yin, 2008). Case studies are suitable when aiming to gain an in-depth understanding of the phenomenon under study within a single setting (e.g. Cavaye, 1996). Our approach involved the cases of two VPTs, which we present next.

3.1 The Two Cases

Case 1: Our first VPT, Saint-Germain (a pseudonym), took part in an Industry-Academia collaboration project organized by a French university which every year invites engineers from across the world to partake (either virtually or F2F) in a 24-hour project with the aim of designing a prototype selected from a list of preselected design briefs (a recycling object for the office). Winning prototypes are commercially exploited by the sponsoring companies. Involved in the project are engineers from the sponsoring companies, though the participating VPTs receive minimal supervision. Saint-Germain was a VPT of ten, equally dispersed between the UK and France, junior engineers with up to one-year professional experience. Due to the very short lifecycle of the project (i.e. 24 hours), we were able to capture most (if not all) interactions between the VPT members.

Case 2: Our second VPT, Los Innovadores (a pseudonym), took part in a similar Industry-Academia collaboration project organized by a Slovenian University for a period of five months with the aim of designing a pre-defined prototype (a kitchen utensil for men). Two global companies were involved in the project, which selected the best prototypes for production and commercialization. Los Innovadores was a team of eight mechanical engineers and industrial designers dispersed across Slovenia, Croatia, Hungary and the UK. The VPT under study had a lifecycle of 5 months during which team members met virtually on a biweekly basis and then in a F2F environment during the last week of the project in order for them to put their prototypes together.

3.2 Data Collection and Analysis

In line with the case study approach, we adopted different data collection methods in order to get an in-depth understanding of the two cases. Observations and interviews constituted the two main data collection methods which were supported by documentation and data in the form of communication and design outputs. Observation was non-participant and was conducted by the first author who at-

tended (and video-recorded) the activity of Case 1 from the UK site throughout the 24 hours. For Case 2, observation was conducted sporadically in Phases 1, 2 and 4 of the project and it was not recorded. Interviews were mostly individual, in-depth and semi-structured in nature, though two focus groups were also conducted in Phases 1 and 4 of Case 2. Further details on the data collection methods are outlined in Table 1 below.

	Case 1: Saint-Germain	Case 2: Los Innovadores
Observations	<ul style="list-style-type: none"> • 24 hours of UK subgroup activity • 13 video-conference/Skype sessions (5 hours) 	<ul style="list-style-type: none"> • 1 video-conference session (2 hours) in Phase 1 • 1 video-conference session (2 hours) in Phase 2 • 1 week (40 hours) of F2F work in Phase 4
Interviews	<ul style="list-style-type: none"> • 5 individual interviews after the project • 5 informal chats before the project 	<ul style="list-style-type: none"> • 4 individual interviews in Phases 2 and 3 • 2 members interviewed in focus groups in Phases 1 • 6 members interviewed in a focus group in Phase 4
Other data	<ul style="list-style-type: none"> • Project documentation • UK subgroup written outputs (e.g. flip-chart notes) • Communication outputs (e.g. emails) 	<ul style="list-style-type: none"> • Project documentation • Reviews and evaluation forms at each phase

Table 1. *Data Collection.*

Analysis is inductive and is currently being conducted separately for the two cases and the different types of data within each case. On the one hand, observations are used to familiarize ourselves with the context of each case and to gain an understanding of the innovation process followed by the two VPTs. In Case 1, in which observations were recorded, we watched the videos repeatedly until we made sense of the different phases of the innovation process. We are now at the stage where we begin to understand the factors which are relevant to the FFE. Case 2 was different in that the phases of the innovation process were predefined by the project organizers and leaders and the members had been instructed to work around them. We are thus reviewing our notes from the observations in order to understand the issues faced by the VPT members in each phase. On the other hand, interviews were transcribed and are now being analysed on QSR NVivo 10 in our effort to identify themes relative to our research aims. Other data are either used for familiarization purposes (e.g. project documentation) or to further enhance our understanding of how the teams worked together (e.g. emails). The different types of collected data are not used for triangulation purposes, but rather for completion, in line with the interpretivist approach.

4 Preliminary Findings

Our analysis is underway and it has so far helped us position the different FFE stages as they emerged from the collected data within the NPD process followed by the two teams. On the one hand, Saint-Germain (Case 1) were given complete freedom to decide on how they should work towards their design task for the 24 hours of the project. We identified two stages in which they performed FFE-related activities: kick-off, task understanding and delegation (stage 1); and idea generation, screening and selection (stage 2). On the other hand, Los Innovadores (Case 2) followed a pre-determined NPD process comprising four stages, the first two of which were found to relate to the FFE: market research (stage 1); and conceptual design (stage 2).

Further to unpacking these FFE stages within the NPD process of the two teams, our analysis has begun to explain how the unique characteristics of VPTs influence the different FFE activities performed in each stage of each team. For example, the data highlight that the use of ICTs plays a twofold role; on the one hand, it can act as an inhibitor when trying to generate and evaluate ideas at the team level, though, on the other, it may act as an enhancer when wanting to concentrate on a task that requires analytical ability.

5 Expected Contributions

At the time of writing, we have begun to analyse our dataset which has so far helped us identify the different FFE stages in the two teams, and explain how the unique characteristics of VPTs (e.g. ICTs, geographical dispersion) influence FFE activities. We moreover foresee interesting findings on the role played by subgroups (Case 1) in comparison to VPTs comprising isolated members (Case 2) as well as on the influences of time pressure (Case 1) and the temporary character of the two teams overall. At the conference, our analysis will be complete and we wish to unpack these findings in more depth. Our expectation is to contribute to the relevant IS, management and innovation literatures by unpacking how the FFE of innovation is managed in the context of VPTs, expanding studies on VPTs in general (Gilson *et al.*, 2015), and creativity and innovation in VPTs in particular (e.g. Chamakiotis *et al.*, 2013; Gibson and Gibbs 2006), as well as studies addressing the FFE in the traditional team literature (e.g. Kim and Wilemon, 2002).

References

- Badrinarayanan, V. and D. B. Arnett (2008). "Effective virtual new product development teams: an integrated framework." *Journal of Business & Industrial Marketing* 23 (4), 242-248.
- Brentani, U. and S. E. Reid (2012). "The Fuzzy Front-End of Discontinuous Innovation: Insights for Research and Management." *Journal of Product Innovation Management* 29 (1), 70-87.
- Bengtsson, M. and Ö. Sölvell (2004). "Climate of competition, clusters and innovative performance." *Scandinavian Journal of Management* 20(3), 225-244.
- Bertels, H. M., E. J. Kleinschmidt and P. A. Koen (2011). "Communities of Practice versus Organizational Climate: Which One Matters More to Dispersed Collaboration in the Front End of Innovation?" *Journal of Product Innovation Management* 28 (5), 757-772.
- Bohlmann, J. D., J. Spanjol, W. J. Qualls and J. A. Rosa, J. A. (2013). "The interplay of customer and product innovation dynamics: an exploratory study." *Journal of Product Innovation Management* 30(2), 228-244.
- Cascio, W.F. and S. Shurygailo (2000). "E-leadership and virtual teams." *Organizational Dynamics* 31 (4), 362-376.
- Cavaye, A. L. M. (1996). "Case study research: a multi-faceted research approach for IS." *Information Systems Journal* 6 (3), 227-242.
- Chamakiotis, P., E. A. Dekoninck and N. Panteli (2013). "Factors influencing creativity in virtual design teams: An interplay between technology, teams and individuals." *Creativity and Innovation Management*, 22 (3), 265-279.
- Chong, D. S., W. Eerde, C. G. Rutte, and K. H. Chai (2012). "Bringing employees closer: the effect of proximity on communication when teams function under time pressure." *Journal of Product Innovation Management* 29 (2), 205-215.
- Frishammar, J., H. Florén and J. Wincent (2011). "Beyond managing uncertainty: Insights from studying equivocality in the fuzzy front end of product and process innovation projects." *IEEE Transactions on Engineering Management* 58 (3), 551-563.

- Gajendran, R. S., and A. Joshi (2012). "Innovation in globally distributed teams: The role of LMX, communication frequency, and member influence on team decisions." *Journal of Applied Psychology* 97(6), 1252.
- Gibson, C. B. and J. L. Gibbs (2006). "Unpacking the concept of virtuality: The effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation." *Administrative Science Quarterly* 51 (3), 451-495.
- Globocnik, D. and S. Salomo (2015). "Do formal management practices impact the emergence of bootlegging behavior?" *Journal of Product Innovation Management* 32 (4), 505-521.
- Gressgård, L. J. (2011). "Virtual team collaboration and innovation in organizations." *Team Performance Management: An International Journal* 17 (1/2), 102-119.
- Griffith, T.L., J.E. Sawyer, and M.A. Neale (2003). "Virtualness and knowledge in teams: Managing the love triangle of organizations, individuals, and information technology." *MIS quarterly* 27 (2), 265-287.
- Harvey, M. G. and D. A. Griffith (2007). "The role of globalization, time acceleration, and virtual global teams in fostering successful global product launches." *Journal of Product Innovation Management* 24 (5), 486-501.
- Hultink, E. J. and H. S. Robben (1999). "Launch strategy and new product performance: an empirical examination in the Netherlands." *Journal of Product Innovation Management* 16 (6), 545-556.
- Kayworth, T.R. and D.E. Leidner (2000). "The global virtual manager: a prescription for success." *European Management Journal* 18 (2), 183-194.
- Khurana, A. and S. R. Rosenthal (1998). "Towards holistic "front ends" in new product development." *Journal of Product Innovation Management* 15 (1), 57-74.
- Kim, J. and D. Wilemon, D. (2002). "Focusing the fuzzy front-end in new product development." *R&D Management* 32 (4), 269-279.
- Kock, A., W. Heising and H. G. Gemünden (2015). "How Ideation Portfolio Management Influences Front-End Success." *Journal of Product Innovation Management* 32 (4), 539-555.
- Kyriazis, E., G. Massey, P. Couchman and L. Johnson (2015). "Friend or foe? The effects of managerial politics on NPD team communication, collaboration and project success." *R&D Management* DOI: 10.1111/radm.12150
- Lee, J. Y. and N. Panteli (2010). "Business strategic conflict in computer-mediated communication." *European Journal of Information Systems* 19(2), 196-208.
- Lipnack J. and J. Stamps (1997). *Virtual Teams: Reaching Across Space, Time, and Organizations with Technology*. New York, NY: John Wiley & Sons, Inc.
- Magni, M., L. M. Maruping, M. Hoegl and L. Proserpio (2013). "Managing the unexpected across space: Improvisation, dispersion, and performance in NPD teams." *Journal of Product Innovation Management* 30 (5), 1009-1026.
- Markham, S. K. (2013). "The Impact of Front-End Innovation Activities on Product Performance." *Journal of Product Innovation Management* 30 (S1), 77-92.
- Muethel, M. and M. Hoegl (2016). Expertise coordination over distance: Shared leadership in dispersed new product development teams. In: *Leadership lessons from compelling contexts* (pp. 327-348). Emerald Group Publishing Limited.
- Ocker, R.J., H. Huang, R. Benbunan-Fich and S.R. Hiltz (2011). "Leadership dynamics in partially distributed teams: An exploratory study of the effects of configuration and Distance." *Group Decision and Negotiation* 20 (3), 273-292.
- Panteli, N. (2004). "Situating Trust within Virtual Teams." In: *Virtual Teams: Contemporary Insights*. Ed. by S. Reddy. Hyderabad, India: ICFAI University Press.
- Parjanen, S. (2012). "Experiencing creativity in the organization: from individual creativity to collective creativity." *Interdisciplinary Journal of Information, Knowledge, and Management* 7, 109-128.

- Salomo, S., E. J. Keinschmidt and U. De Brentani (2010). "Managing new product development teams in a globally dispersed NPD program." *Journal of Product Innovation Management* 27(7), 955-971.
- Shachaf, P. (2008). "Cultural diversity and information and communication technology impacts on global virtual teams: An exploratory study." *Information & Management* 45 (2), 131-142.
- Storey, C., P. Cankurtaran, P. Papastathopoulou, P., and E. J. Hultink (2016). "Success Factors for Service Innovation: A Meta-Analysis." *Journal of Product Innovation Management*. DOI: 10.1111/jpim.12307
- Urban, G. L., J. R. Hauser, and G. L. Urban, G. L. (1993). *Design and marketing of new products* (Vol. 2). Englewood Cliffs, NJ: Prentice hall.
- Verworn, B., C. Herstatt and A. Nagahira (2008). "The fuzzy front end of Japanese new product development projects: impact on success and differences between incremental and radical projects." *R&D Management* 38 (1), 1-19.
- Yin, R. K. (2008). *Case study research: Design and methods*. Thousand Oaks, CA: Sage Publications, Inc.